



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
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Form No. (10-226)

Reporting Year: 2006	Park: Shenandoah NP	Select the type of permit this report addresses: Scientific Study	
Name of principal investigator or responsible official: Richard Tollo		Office Phone: (202)994-6960	
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Additional investigators or key field assistants (first name, last name, office phone, office email) No co-investigators			
Project Title (maximum 300 characters): GEOLOGIC EVOLUTION OF MESOPROTEROZOIC BASEMENT, BLUE RIDGE PROVINCE, SHENANDOAH NATIONAL PARK, VIRGINIA			
Park-assigned Study or Activity #: SHEN-00133	Park-assigned Permit #: SHEN-2001-SCI-0011	Permit Start Date: Mar 15, 2001	Permit Expiration Date: Dec 31, 2010
Scientific Study Starting Date: Mar 15, 2001		Estimated Scientific Study Ending Date: Dec 31, 2010	
For either a Scientific Study or a Science Education Activity, the status is: Continuing		For a Scientific Study that is completed, please check each of the following that applies: <input type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed	
Activity Type: Research			
Subject/Discipline: Geology / General			

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

This study is designed to foster an improved understanding of the tectonic and petrologic evolution of Mesoproterozoic igneous and metamorphic rocks constituting the geologic basement of the Blue Ridge province of Virginia. The project involves detailed field mapping of bedrock exposures, petrologic and geochemical analysis of representative samples, and U-Pb isotopic analysis of zircons. The integrated data set is being used to improve current models for the geologic evolution of the Grenville orogen in Virginia.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

During the past year, progress in this research project includes: (1) expanded field mapping and sampling of geologic units, (2) petrographic analysis of thin section samples, (3) major- and trace-element geochemical analyses of selected whole-rock samples, and (4) U-Pb isotopic analyses of zircons and monazites from four of the mapped lithologic units. To date, field mapping, undertaken both within the Park and in contiguous adjoining areas, has determined the areal extent and mutual geologic relationships of basement rocks in the Chester Gap, Washington, Woodville, Thornton Gap, Old Rag Mountain, Big Meadows, and Fletcher 7.5-minute quadrangles. During the past year, mapping and sampling efforts were concentrated on basement rocks located within the Bentonville and Woodville quadrangles. In addition, we have coordinated efforts with another research group working in the nearby Swift Run Gap, Browns Cove, and Crozet quadrangles. The mapping throughout the entire area has demonstrated the existence of about twenty major lithologic units including different types of gneisses, charnockites, and leucocratic granitoids. Results from a comprehensive program of geochemical analyses of all rocks has led in the past year to discovery of a geologically important subset of granitoids (referred to as A-types) that were emplaced as magmas following major Grenvillian orogenesis in the area. The geochronologic data obtained to date, including analyses of eight additional lithologic units during the past year, has resulted in recognition of a series of geologic events in the area that collectively span an interval of at least 150 m.y. This detailed record of geologic activity, which collectively defines the Grenville orogeny in the northern Blue Ridge province, includes at least three periods of magmatism and a major period of deformation and metamorphism. These newly established relationships constitute the first detailed geochronologic calibration of Grenville-age orogenesis in the Virginia Blue Ridge based on integrated studies involving field, petrologic, and isotopic investigations. Such information is important to developing an increased understanding of Precambrian tectonics and the processes by which compressional mountains are created. Moreover, this research is providing detailed mapping of rock distribution and compilation of both mineralogical and geochemical compositions throughout much of the Park and adjoining area. Such studies should provide a firm quantitative basis for understanding the heterogeneous nature of soil distribution. Such surficial information is, in turn, critical to understanding the effects of soil characteristics on plant ecology, as well as environmental concerns such as the buffering capabilities of soil and bedrock for both groundwater and surface runoff. Studies planned for 2005 include: (1) continued field mapping and petrographic analysis of rocks in the northern part of the study area, (2) major- and trace-element geochemical analyses of additional whole-rock samples and (3) U-Pb isotopic analyses of zircons from key lithologic units.

This research project has become part of a collaborative effort involving scientists from the U.S. Geological Survey and Virginia Division of Mineral Resources designed to produce multi-disciplinary resource maps for Shenandoah National Park. A major product from this research will be a new geologic map of the National Park and vicinity, supported by a wide array of modern field and analytical data.

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

Yes

If "Yes", identify where the specimens currently are stored:

George Washington University

Bell Hall 2029 G Street, NW

Washington, DC 20052

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):

\$15000

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.